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EPA Region 5 Records Ctr.



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DRAFT

Air & Process Stream Sampling Plan
Pursuant to U.S. EPA Administrative Order (dated February 6, 1995)

IE Job No. C055-076

Approved By: _____ Date: _____
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TABLE OF CONTENTS

1.0	BACKGROUND	1
2.0	DATA USE OBJECTIVES	2
3.0	APPROACH AND SAMPLING METHODOLOGIES	3
3.1	Process Stream Sampling	4
3.2	Air Sampling	7
3.3	Stack Testing	8
3.4	Criteria for Additional Sampling	8
4.0	PROJECT ORGANIZATION AND RESPONSIBILITIES	10
5.0	QUALITY ASSURANCE OBJECTIVES AND ANALYTICAL METHODS	11
6.0	DELIVERABLES	13

1.0 BACKGROUND

As required under U.S. EPA's most recent Unilateral Administrative Order (UAO) (dated February 6, 1995) and subsequent meetings with the U.S. EPA. Chicago International Exporting, Inc. (CIE) is required to perform air and process materials sampling and analysis for PCBs and lead. This work plan is intended to meet U.S. EPA requirements.

2.0 DATA USE OBJECTIVES

Based on our understanding of the UAO, the primary concern appears to be that onsite materials may contain excessive levels of PCBs and lead and are not being managed accordingly. The onsite materials of most concern include: baghouse dust, copper fines, scrap steel, shredder pickings and fugitive air emissions from the shredding and chopping/separating processes.

The purposes of the sampling effort are twofold:

- 1) To determine the presence and levels of PCBs and lead in the incoming process streams, final products, and in fugitive air emissions.
- 2) To determine if the concentrations of PCBs and lead in the incoming process streams, final products and fugitive air emissions exceed applicable regulatory standards.

3.0 APPROACH AND SAMPLING METHODOLOGIES

This sampling effort will consist of: Collection and analysis of ambient air samples at the perimeter of the site, collection and analysis of solid materials from the shedding and chopping/separating processes and stack testing of baghouses. The solid materials to be sampled include the following process streams:

- Baghouse dust
- Copper fines
- Shredder pickings
- Copper scrap before it is processed on chopper/separator line
- Steel scrap
- Floor and pavement sweepings
- Non-metallic fluff off of separating (air) table

In order to ensure that samples are representative of typical facility operating conditions, sampling will be conducted once the baghouses and all other equipment are operating as intended. Upon approval of this work plan, limited production on both the shredding line and chopping/separating line will be conducted to evaluate performance of the baghouses and all other equipment. If repairs and/or modifications are necessary, they will be conducted as expeditiously as possible, though it should be recognized that parts availability and other factors beyond the control of CIE may prolong such work.

Once the lines and pollution control equipment are operating properly, the USEPA will be notified and the first round of sampling will be scheduled as soon after the first week of full production as possible. Process streams will be sampled once per week for an initial period of 3 weeks. Ambient air samples will be collected over an initial period of 3 consecutive days. Both baghouses will be stack tested when sufficient onsite materials have accumulated to allow a full day of maximum production on each line or no later than 60 days after commencement of normal operations.

The need for additional sampling after this initial round of sampling will be based on the criteria presented in Section 3.4.

3.1 Process Stream Sampling

Samples of the process streams will be collected on a weekly basis for an initial period of 3 consecutive weeks. To account for variability of the materials being shredded, which may include varying proportions of shredder pickings and small motors, composite samples of each material (excluding the first sampling event of the shredder pickings) will be collected each week. Samples of the shredder pickings will be collected in a slightly different manner as further described later in this section.

For those materials stored in containers, ten subsamples will form each sample and will be evenly distributed over the number of containers (i.e., Gaylord boxes, steel boxes or drums) that have accumulated onsite during the week. For example, if 2 containers have accumulated, 5 subsamples will be collected from each box; if 3 containers have accumulated, 3 subsamples will be collected from two of the containers and 4 subsamples will be collected from the third container.

Each subsample will be collected directly from the containers using hand tools, such as a stainless steel hand auger, stainless steel scoop, steel shovel, etc. To the maximum extent possible, the subsamples from each container will be collected from equally spaced points within the container.

Each ten-point composite sample will consist of enough material to fill a 5-gallon bucket. The composite sample will then be spread onto a clean surface and evenly divided into replicate samples, one of which will be placed into a jar for delivery to the laboratory.

For those materials accumulated in a stockpile (e.g., copper fines, scrap copper but not including the shredder pickings), the sampling guidelines provided in U.S. EPA's Sampling Guidance for Scrap Metal Shredders (EPA 747-R-93-009, August 1993) will be followed. The grid sampling methodology described in Chapter 2 and preparation for analysis described in Chapter 3 will be followed. These chapters are provided in Appendix A.

Obtaining a representative sample of the shredder pickings will be more difficult since the bulk of the material consists of solid metal pieces much larger than what the required analytical methods can accommodate (which are 15-30 grams of material or about a quarter of an 8 ounce jar) and because the PCBs seem to be primarily associated with the dirt and fluff within each load. Therefore, to obtain a more representative sample of the shredder pickings, the first sampling event will involve running 1-2 loads through the shredder and weighing the amount of dirt and fluff captured by the baghouse. The second and third sampling events will then be conducted in accordance with Chapters 2 and 3 of U.S. EPA's Sampling Guidance for Scrap Metal Shredders using the grid sampling methodology.

The purpose of running 1-2 loads of shredder pickings through the shredder and then weighing the shredded materials and baghouse dust is to more accurately determine the proportion of dirt and fluff in a typical load of shredder pickings. In this way, proportioning the amount of dirt and fluff in comparison to solid metal material can be done more accurately when the samples are collected in accordance with U.S. EPA's guidance manual during the second and third sampling events.

Prior to running any shredder pickings for the first sampling event, the baghouse on the shredder will be thoroughly cleaned to remove dirt and fluff from previous runs. When the loads of shredder pickings are delivered, they will be weighed full and empty by the onsite, calibrated truck scale. The containers used for holding

the post-shredded material and the baghouse dust will be weighed by the other smaller onsite scale.

One to two loads of shredder pickings will then be run through the shredder. Afterwards, the baghouse will be thoroughly cleaned. All containers holding the post-shredded material and the baghouse dust will be weighed using the smaller onsite scale to determine the percentage of dirt and fluff (i.e., baghouse dust) within a typical load.

One sample jar of the baghouse dust will be collected and submitted to the laboratory for PCBs and total lead analysis. Sample jars of the shredded material will be proportionately combined into a single sample at the laboratory and analyzed for PCBs and total lead. Then, knowing the concentrations of PCBs and lead in each material and the proportion of each material within a typical load of shredder pickings, a single concentration of PCBs and a single concentration of lead can be calculated.

The baghouse dust for this first sampling event of the shredder pickings will not be composited since the material will be thoroughly mixed by the time it is placed into a container and because other incoming materials (i.e., small motors) will not be shredded with the shredder pickings. However, the shredded material will consist of the following segregated materials, which will have to be proportionately consolidated into a single sample:

- copper fines
- scrap copper
- scrap steel

A single grab sample of each segregated material will be obtained and submitted to the laboratory, where the proper percentage of each material will be physically

proportioned to make a single sample of shredded material. Since each container of segregated material will be uniform in texture and composition and other incoming materials (i.e., small motors) will not be shredded with the shredder pickings, collection and compositing of subsamples will not be necessary.

Sample containers will be labeled and delivered under proper U.S. EPA chain-of-custody protocol using the forms provided by the U.S. EPA approved laboratory.

All sampling equipment that has the potential to come into contact with the sample will be decontaminated in accordance with the Sampling Equipment Decontamination procedures detailed in the Sampling QA/QC Work Plan prepared by Ecology and Environment, Inc., which is contained in Appendix B.

3.2 Air Sampling

Low volume air sampling will be performed at the northwest corner of the facility, on the east side of Wells Street. An initial round of 3 consecutive days of sampling will be performed. Each day of sampling will be performed during normal working hours (when both lines are operating) for a continuous period of 4-8 hours.

Sampling for PCBs will be performed in accordance with OSHA Method ID-121 (air filter samples). Sampling for lead will be in accordance with NIOSH Method 5503. Each methodology will require its own sampling instrumentation.

3.3 Stack Testing

When sufficient materials have accumulated to allow maximum production on the shredding line and on the chopping/separating line or no later than 60 days after commencement of normal operations, one stack test will be performed on each baghouse.

Stack testing will be performed in accordance with the requirements stipulated in U.S. EPA's Request for Information dated 5/5/95, which has been photocopied and provided in Appendix C.

3.4 Criteria For Additional Sampling

Except for those materials that are clearly demonstrated to be of no concern after the first sample analysis. The initial round of sampling will consist of 3 consecutive days of air sampling (1 sample day) and 3 consecutive weeks of process stream sampling (1 sample/process stream/week). After this initial round of sampling, the need for continued sampling will be evaluated as follows.

For the process stream materials, our objective is to determine if PCB and lead concentrations exceed specific regulatory standards. Therefore, we will use the Hypothesis Test for Monitoring Programs detailed in Appendix A.2, U.S. EPA's Sampling Guidance for Scrap Metal Shredders: Field Manual (EPA 747-R-93-009, August 1993). A regulatory standard of 50 mg/kg for PCBs will be assumed.

The applicable regulatory standard for lead in the process streams is 5 mg/l using the TCLP analytical methodology. However, the U.S. EPA believes that the TCLP Methodology is not appropriate for scrap metal media so it is requiring analysis for total lead rather than TCLP lead. The U.S. EPA will then correlate the total lead results to an equivalent TCLP concentration based on the dilution factor and other considerations. It is our understanding that the U.S. EPA considers a total lead concentration of 1300 mg/kg to approximately correlate to a 5mg/l TCLP concentration.

For the ambient air samples, a *student's t* test will be performed on the analytical results to determine the range of concentrations assuming a 95% confidence interval. The range of concentrations will then be compared to applicable

regulatory standards. The applicable standard for lead shall be OSHA's PEL of 0.05 mg/m³ and the standard for PCBs shall be OSHA's PEL of 1 mg/m³.

If the results obtained from any of the materials pass the statistical tests (i.e., they do not exceed its corresponding standard), additional sampling of that particular material will not be conducted. If the results from a particular material exceed its corresponding standard, the need for additional sampling of that material will be based on how a the standard was exceeded. For example, if the exceedance was marginal, additional sampling may be able to demonstrate that the standard is not being exceeded over the long term. However, if the exceedance is substantial, it may be obvious that additional sampling will not change the basic result.

As each additional round of samples are collected and analyzed, all of the analytical results generated up to that point will be subjected to the statistical analyses described above.

4.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

Glen Anderson will serve as Project Manager for this sampling effort. Principal in Charge will be Victor Bhatia. Field sampling of the process streams will be performed by Glen Anderson or an alternate approved by the U.S. EPA On-Scene Coordinator (i.e., Steve Faryan). Setup of the air samplers and weekly collection of the air samples will be performed by Victor Bhatia or an alternate approved by the U.S. EPA On-Scene Coordinator.

The laboratory selected for this project must meet the requirements of this work plan, the site-specific Quality Assurance Project Plan and any other requirements (e.g., documentation, report format, etc.) detailed in U.S. EPA's Quality Assurance/Quality Control Guidance For Removal Activities (EPA/540/G-90/004, April, 1990). For the air sample analyses, Pace Incorporated out of Golden, Colorado will be used.

For the process stream samples, one of the following labs will be used:

- Great Lakes Analytical, Buffalo Grove, Illinois
- IEA, Schaumburg, Illinois
- NET, Bartlett, Illinois
- A2I, Merrillville, Indiana

For those labs not already approved by U.S. EPA, a performance evaluation sample for PCBs and total lead will be submitted with the first submission of samples.

Laboratory analyses of process stream samples will meet the QA2 quality assurance objective as defined by U.S. EPA's Quality Assurance/Quality Control Guidance For Removal Activities (EPA/540/G-90/004, April, 1990). Both definitive identification and non-definitive quantitation for unscreened data will be developed for the process stream samples. Data validation will be performed on 10% of the process stream samples in accordance with the guidelines provided in Part II of U.S. EPA's Quality Assurance/Quality Control Guidance for Removal Activities (EPA/540/G-90/114, April 1990). Laboratory analyses of low volume air samples will meet the quality assurance objectives specified in the respective methodologies.

Parameter	Matrix	Analytical Method	Spikes		Detection Limit	QA Objective
			Matrix	Surrogate		
TCLP Lead	BD	EPA 1311/1610/7000	no	n/a	0.080 mg/l	QA2
PCBs	PS	EPA 8080	no	yes	50 ug/kg	QA2
Total Lead	PS	EPA 7420	no	n/a	5.0 ug/g	QA2
PCBs	A	NIOSH 5503	no	no	.03 ug/sample	n/a
Lead	A	OSHA ID 121	no	n/a	0.05 ug/sample	n/a

Note: PS = Process Stream (not including baghouse dust). A = Samples from Low Volume Air Samplers. BD = Baghouse Dust.

TABLE 2
FIELD SAMPLING SUMMARY TABLE
INITIAL ROUND OF SAMPLING

Parameter	Matrix	Container (# Required)	Preservative	Holding Times	# of Samples	QC Extras				Duplicates	Total Samples
						Field Blanks	Trip Blanks	QC Positives	Matrix Spikes		
PCBs	PS	8 oz glass (1)	4°C	14/40	21	3	—	—	—	3	27
TCLP Lead and Total Lead	PS and BD	8 oz glass (1)	4°C	3/40	3	1	—	—	—	1	5
					18	3	—	—	—	3	24
PCBs	A	Glass Fiber Filter and Florisil Tube (1)	4°C	14/40	3	1	—	—	—	—	4
Lead	A	MCE Filter Cassette (1)	4°C	7/40	3	1	—	—	—	—	4

Notes:

1. PS = Process Stream Samples (solid matrix). A = Samples from Low Volume air samplers. BD = Baghouse dust.
2. Holding times are in days to extraction/analysis or days to analysis.

6.0 DELIVERABLES

Both progress reports and a summary report of all activities will be generated for this project. Progress reports will be generated by Tuesday or Wednesday following each week of project activity and will be faxed to U.S. EPA's On-Scene Coordinator. A draft version of the summary report will be generated within 2 weeks after conclusion of the project.

The progress reports will include a brief summary of field activities performed during the preceding week. Any problems encountered and the corrective action taken will also be discussed. Analytical results will be summarized in a tabular format. After the analytical results from the initial period of sampling are received, and for every round thereafter, progress reports will contain results of the statistical analyses described in Section 3.3.

The summary report will include a description of field activities, tabular summary of analytical results, results of the data validation, statistical analyses, a diagram showing locations of air samplers and the complete analytical data package. The draft version will be submitted for U.S. EPA review and comment, after which it will be finalized.

APPENDIX A

**U.S. EPA's SAMPLING GUIDANCE FOR
SCRAP METAL SHREDDERS
(Chapters 2 and 3)**

2. SAMPLING PROCEDURES

2.1 Basic Sampling Guidelines

Overview. The purpose of the field sampling procedures described in this section is to estimate the overall concentration of PCBs, rather than to identify "hot spots" with high concentrations. Thus the sampling methods described here are intended to produce representative samples of fluff, since this material is generally considered to be the most likely to contain PCBs, if they are present at all.

Fluff is often stored in piles on the shredder site before being shipped to a landfill for disposal. We will differentiate between *stored fluff*, which is stored in piles at the shredder site, and *fresh fluff*, which is produced at the site while sampling is being done. In particular, we will describe different sampling procedures for stored and fresh fluff. The former may consist of very large piles which are difficult to access, while the latter is being continuously produced and is generally easier to sample.

In collecting samples, care should be taken to minimize the disruption of the normal operations of the shredder. This is important not only from the standpoint of maintaining good relations with the shredder operator, but also because the samples collected should, to the greatest extent possible, reflect the normal output of the shredder. If shredding procedures are altered in order to collect samples, the data collected may not reflect the usual PCB content (if any) of the shredder output streams.

How Large Should Samples Be? The materials present in fluff are very heterogeneous, and samples must be relatively large in volume to get a good cross-section of the types of materials present. In most cases, we suggest taking individual samples of about one gallon in size. Many of the sampling procedures we recommend require combining several samples of which each is one-half to one gallon in size. In any case, we recommend that the total volume of fluff collected at a site be at least five gallons.¹

Duration of the Sampling Period. When sampling from the stream of fresh fluff as it is being produced, the duration of the sampling period is an important consideration. Samples

¹ This recommendation is based on techniques for sampling heterogeneous materials presented in a seminar titled "Sampling Methodologies for Monitoring the Environment" by Pierre Gy and Francis Pitard Sampling Consultants.

may be collected only once during a visit, once each half-hour for several hours, or once each half-hour for an entire day. The longer the duration of the sampling period, the greater the likelihood of obtaining a representative sample of shredder output, since it is more likely that the materials shredded will be representative over a longer period. It is difficult to give fixed guidelines on how long to collect samples, but, in general, we suggest collecting samples of fresh shredder output each half-hour for a period of at least eight hours, or one working day. In any case, the general operating procedures followed at the shredder should be considered in deciding how long to make the sampling period and how frequently to collect samples. For example, if an operator runs white goods in the morning and automobiles in the afternoon, samples should be taken of each.

When different types of materials are recycled, the PCB content of the samples may vary considerably. Thus, regardless of the duration of the sampling period and the number of samples collected, the results of one day's sampling cannot be extrapolated to any other day unless the materials that are recycled on the two days are similar. Because of the variability in the materials shredded, high or low concentrations of PCBs may be found at one visit but not on a subsequent visit. Because of this fact, it is important that the samples collected at a site are as representative as possible of the usual activities of the shredding operation.

Collecting Representative Samples. The basic technique that we recommend for collecting samples requires two steps. First, a square, two-dimensional grid is superimposed over the material that is to be sampled, as shown in Figure 2. Stretching strings across the material is an efficient way of constructing the grid; the cells should be approximately equal in area. Next, samples should be taken from each cell in the grid and combined. This type of sampling is called *grid sampling*. It may be applied in sampling either fresh or stored fluff. The purpose of grid sampling is to obtain a sample that is spread throughout the material that is being sampled. Larger grids (e.g., four squares on each side) may be used, but a three-by-three grid is generally sufficient for this purpose.

When sampling material that is spread out in a grid, it is important to dig down into the material *to the bottom*. Finer particles will settle down and samples that are simply grabbed off the top will not be representative.

In order to collect more than one grid sample, use *replicated grid sampling*. Using this procedure, multiple samples are taken from each cell and combined in separate buckets, as illustrated in Figure 3. Each bucket is analyzed as an independent sample of material.

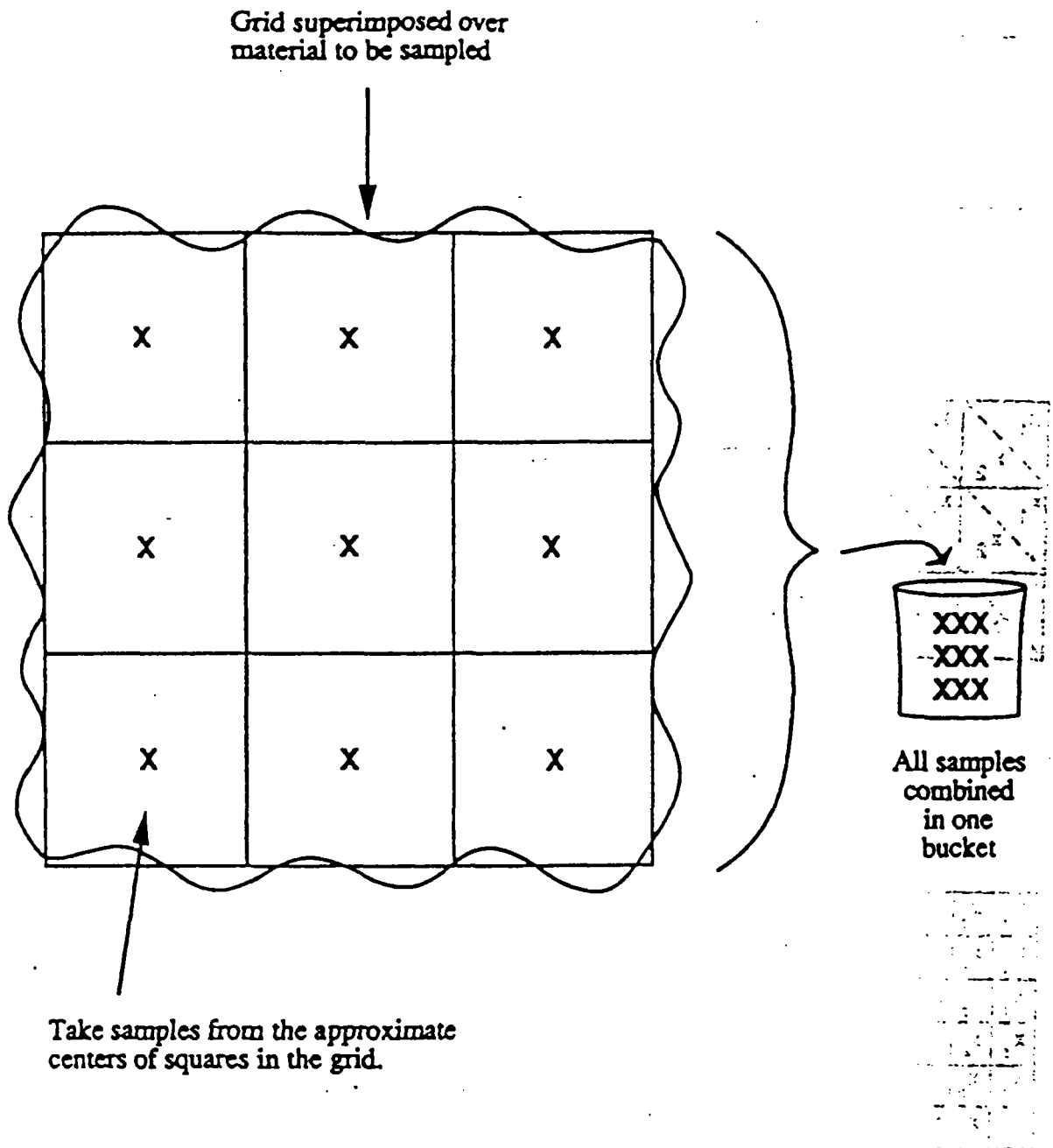


Figure 2. Illustration of grid sampling

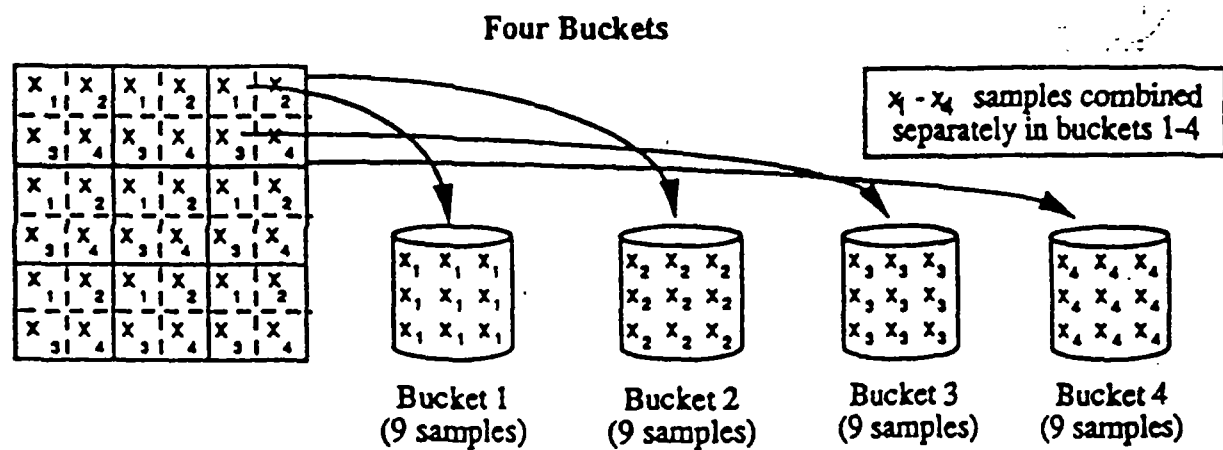
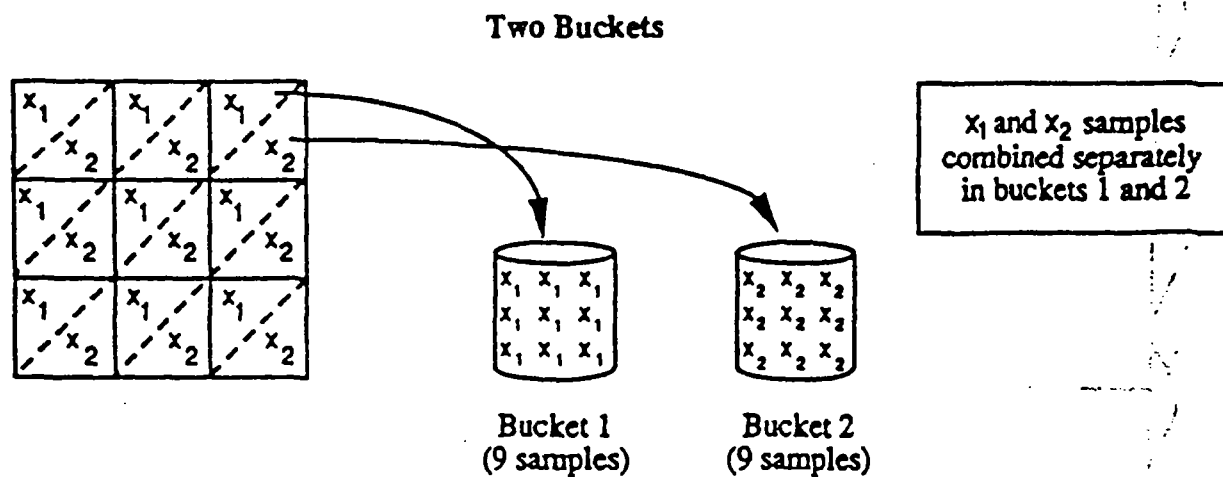
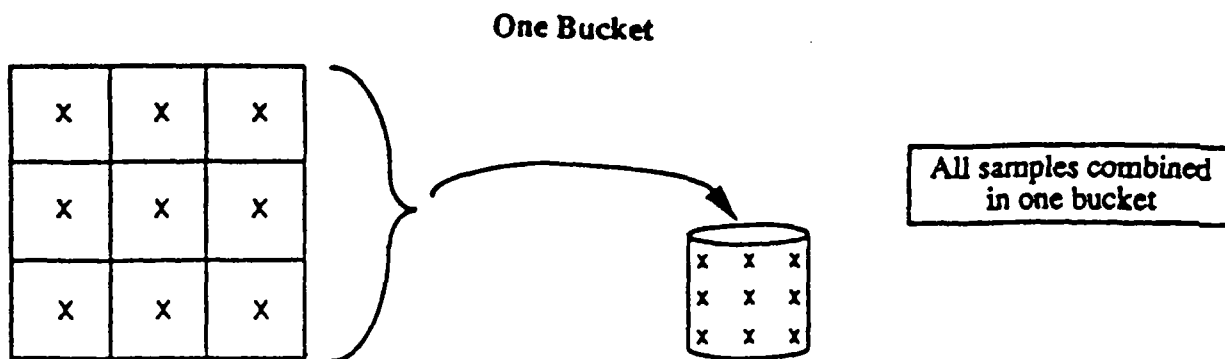


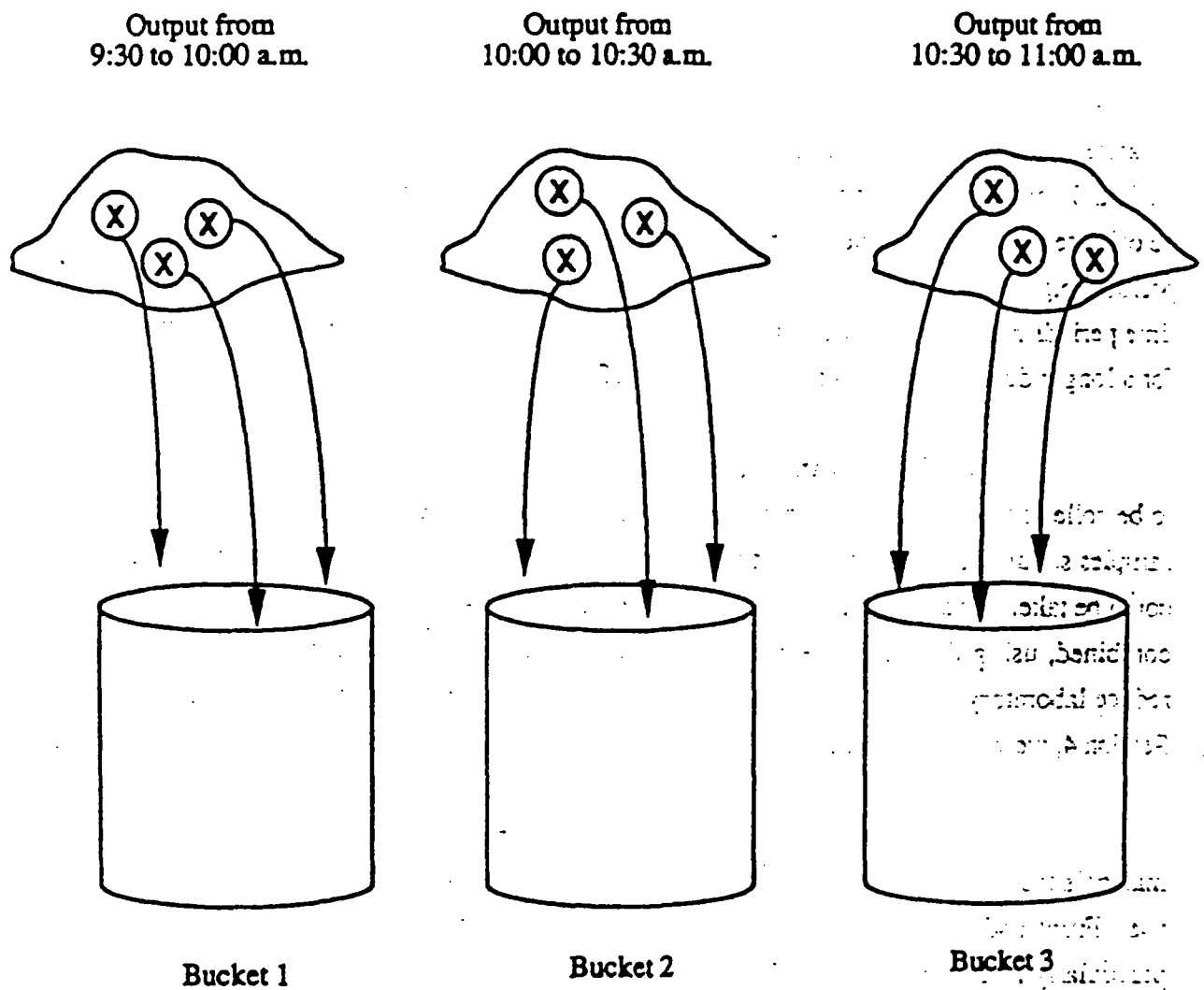
Figure 3. Replicated grid sampling

In some cases, grid sampling is not a practical option. For example, when sampling from large piles of fluff, it will be necessary to collect samples from various points in the pile without formally creating a grid. Detailed descriptions of how to sample stored fluff will be discussed below.

Sampling Over Time. When samples are collected from freshly produced fluff, samples must be collected at different times; for example, sampling might be done each half-hour over a 4- or 8-hour period. Figure 4 illustrates the basic technique for sampling over time. Here a separate grid sample is taken at each point in time, with each time period represented by a different bucket. Each bucket may consist of 1 gallon or more, but only one bucket per time period should be collected. If three samples are required, then samples should be collected at three different time periods (e.g., every 2 hours for a 6-hour period). If more samples are required, then either more time periods must be sampled (e.g., every hour for a 6-hour period) or samples must be collected for a longer duration (e.g., every 2 hours for a 12-hour period).

How Many Samples Should Be Collected? The number of samples that need to be collected depends on the accuracy required. As we will see in more detail later, about 10-20 samples should be sufficient for most purposes. For example, in sampling over time, 16 samples could be taken at half-hour intervals over the course of an 8-hour work day. These samples can be combined, using the technique of *compositing* which will be discussed later in Section 3.2, to reduce laboratory costs. Of course, fewer samples can be taken but at the risk of greater error. In Section 4, we will discuss the trade-offs between sample sizes and the reliability of conclusions.

What Equipment Should be Used? Because of the size and heterogeneity of materials that are produced at shredder sites, conventional core-sampling tools are usually of little use. Front-end loaders and backhoes may be useful for transporting and arranging materials, particularly if large amounts of fluff are involved. Similarly, trowels, rakes and shovels may be useful for smaller amounts of fluff. Because of the difficulty in manipulating fluff, it may be necessary to pick it up by hand and place "grab samples" manually in gallon containers. If available, a rotating gravity tumbler drum (RGTD) may be useful for mixing samples.



Samples Composited into Three Buckets

Figure 4: Sampling over time

Cleaning Equipment and Handling Samples. Whatever equipment is used, it must be clean in order to avoid contaminating the samples that are collected. Furthermore, equipment should be cleaned regularly, preferably after each sample is taken. To clean shovels, hoes, buckets, containers, and other equipment, soak them in dilute (20%) nitric acid and then rinse them three times, first with deionized water, then acetone, and finally hexane. Alternatively, steam cleaning can be used; if the steam condensate is free of PCBs, it can be disposed of easily. By comparison, disposal of solvents is always expensive.

If equipment is not cleaned, samples can become cross-contaminated. Cross-contamination occurs when PCBs from a sample that is contaminated are transmitted to a second sample which was *not previously* contaminated. This problem can occur when materials are not handled carefully and one sample leaks into another, or when equipment is not cleaned and a residue of PCBs builds up and is transmitted to multiple samples.

Besides keeping equipment clean, it is important to handle samples carefully. All samples should be clearly labelled, indicating the time, date and location. Samples should be stored in clean, sturdy containers. If samples are handled manually, gloves should be changed after collecting each sample.

Clearly, the cleaning of equipment can be cumbersome; moreover, it will be impractical in most circumstances to clean large equipment, such as backhoes. However, small equipment and containers should be cleaned as often as possible. While the risk may be small, it is in the best interests of both the shredder and environmental agencies that samples be as free as possible from cross-contamination. Cross-contamination can lead to erroneous conclusions about the level of toxic substances in the media. For example, stored fluff may be contaminated by fresh output, leading to the erroneous belief that the stored material may not be deposited in a sanitary landfill. Cross-contamination is especially serious when it occurs with samples from different sites, since questions of liability may be involved.

2.2 Sampling Fluff

General Guidelines. As described earlier, fluff is generated as a waste product which is separated from recyclable metals after the shredding operation. First, ferrous and nonferrous materials are separated using magnetic devices, and then fluff is separated from the metals either by using cyclone blowers or by washing with water, most commonly the former.

Fluff may either pile up below the cyclone separator or it may be removed to storage piles using conveyor belts.

There are generally three sources of fluff at a shredder site. First, fresh fluff is continuously being produced during the shredder operation. Second, there may be piles of stored fluff, although most shredder operators regularly ship fluff to avoid wasting storage space. Third, some fluff, which we will call *spillover*, is likely to have piled up around conveyor belts and other equipment. Although the basic sampling procedures are similar, we will give directions for sampling each form of fluff separately.

Fresh Fluff: Front-End Loader Assisted. We will describe two methods for sampling fresh fluff, the first of which involves the use of a front-end loader. This method is preferred for reasons of safety, sampling consistency, and minimal facility interruption.

Briefly, the front-end loader method involves (1) collecting the fluff in the front-end loader bucket as it is produced, (2) spreading the collected fluff out on the ground, and (3) taking samples from the fluff after it has been spread out on the ground. In order to use this method, you will need a front-end loader, which should have a safety cab and should be used only by an experienced operator. You will also need a clean space of ground on which to spread out the fluff. In some cases, it may be necessary to arrange with the operator to start and stop the shredder at appropriate intervals.

First, the front-end loader bucket should be positioned under the mouth of the cyclone (or the end of the conveyor belt, depending on which is used) during shredding to collect the fluff. The shredder should run until the bucket is full, typically about 3 minutes, or the equivalent of about two automobiles. (Note: If large objects are being shredded, it is preferable to process the entire object, rather than part of it.) After the shredder has stopped, move the front-end loader to an open, clean area for spreading the fluff. This area should be about 10 feet square, or large enough that the contents of the front-end loader can be spread evenly to a depth of about 1 foot.

Second, have the front-end loader operator spread the collected fluff on the ground in a square area to an even depth of about 1 foot, using the back of the bucket. Divide the square into nine roughly equal subsections, as shown in Figure 2. Take one-half gallon of material from the approximate center of each subsection, using a shovel and digging down into the material; combine the samples in the 5-gallon bucket. Smaller samples may be collected on a tarpaulin

placed under the cyclone or conveyor, moved to a clear area and then spread with a rake. For small samples, four roughly equal subsections may be used, with a half-gallon being selected from the center of each one.

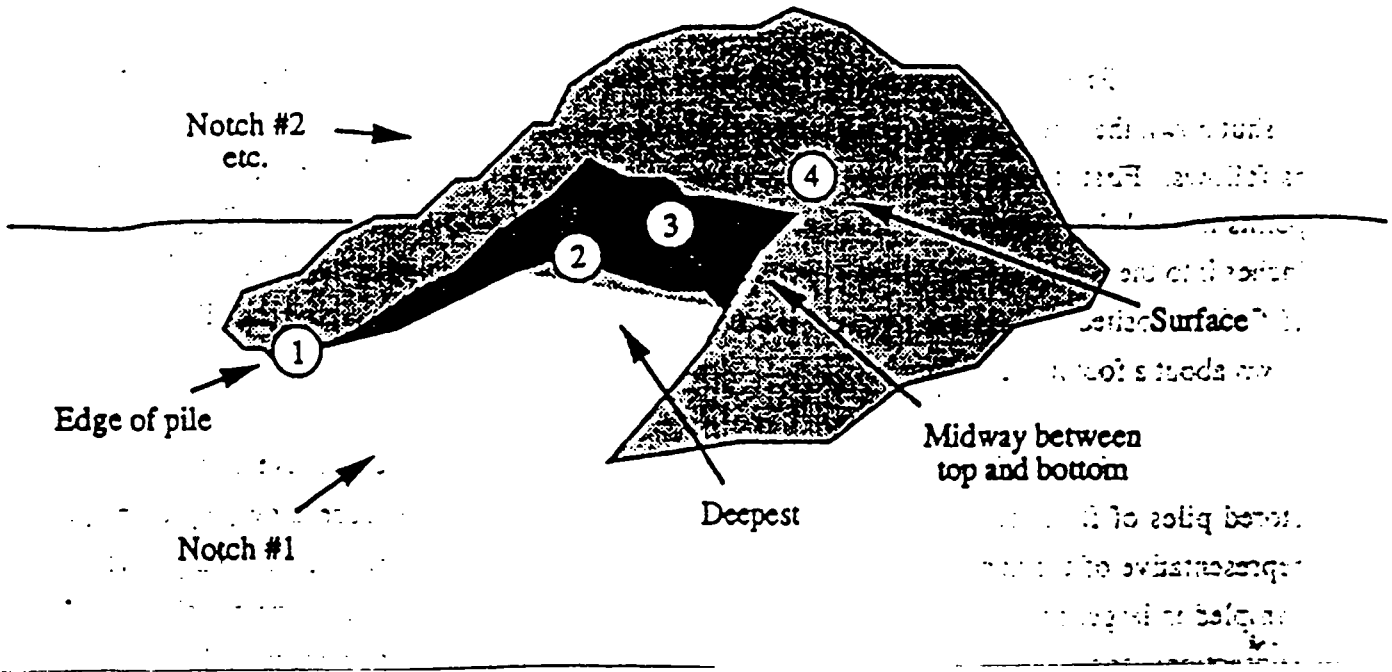
At some sites, the fluff stream is fed continuously into rolloff boxes which can contain up to 20 cubic yards of material. In order to collect samples of fluff at these sites, the boxes must be pulled away from the output stream, which can then be collected using a front-end loader as described above.

Fresh Fluff Sampling Without a Front-End Loader. Arrange for the operator to shut down the line after shredding material for about 3 minutes. Take five one-gallon samples as follows. First, take four one-gallon samples by systematically sampling at four equidistant points around the perimeter of the pile, approximately 1 foot above the ground. Dig about 18 inches into the pile horizontally, or, depending on the size of the pile, far enough to obtain layers of fluff deposited at different times. Take the fifth sample from the center of the pile, digging down about a foot into the pile.

Stored Fluff. It is much more difficult to obtain representative samples from stored piles of fluff, but such samples are potentially more useful because they may be more representative of the normal output of the shredder. (We will assume that the stored pile to be sampled is large; small piles can be raked into a square shape, divided into nine roughly equal subsections, and sampled as described above for fresh fluff.) In collecting samples from stored piles of fluff, the objective is to obtain samples of the *oldest* fluff, the *deepest* fluff, and two samples of *surface* fluff. If a large pile of new fluff has been stored next to a smaller pile of old fluff, then the deepest fluff may not be the oldest. However, if the oldest fluff is also the deepest, take a sample half-way between the bottom and the surface in place of the deepest fluff. The procedures described below, which are illustrated in Figure 5, will provide a total of 20 one-gallon samples. To prevent cross-contamination between samples, collect one five-gallon bucket at a time.

First, take five one-gallon samples of surface fluff from the edge of the pile, at equal distances around the pile, one foot off the ground. Dig straight into the surface, including the actual surface material in the sample.

4/16



Second, use heavy moving equipment (such as a front-end loader) to cut five notches in the pile for the other samples, as shown in Figure 4. These notches should be located at equal distances along the perimeter of the pile, if possible. From each notch, take a one-gallon sample from the fluff that is deepest down in the pile. Some care may be required to get a sample of the deepest fluff in the notch, since fluff from the surface may fall down into the notch. One approach would be to have the operator remove upper layers of the pile before cutting the notch; it might also help to take the sample from the center of the notch, rather than the sides where material is more likely to fall into the notch. In making notches and collecting samples, remember that safety is a paramount consideration. Do not cut notches deeper than five feet in height. Proceed with caution at all times.

Third, collect five one-gallon samples of the oldest fluff. You will have to ask the shredder operator which fluff is the oldest. It may be a particular area of the fluff pile, or it may be the deepest layer. If it is not known which fluff is the oldest, then take a one-gallon sample from a point mid-way between the bottom of the pile and the surface in each of the notches.

Finally, collect five one-gallon samples of fluff from the surface of the pile at points near the center of the pile. The notches may provide easy access to points near the center of the pile.

As noted above, this procedure will result in 20 samples. After reviewing Section 4, which discusses analyzing the samples, you may decide that more samples are needed. The number of samples may be increased by taking more samples at each of the steps described above. For example, if six samples are taken from the perimeter, six notches are cut, etc., six samples of the deepest fluff are taken, and so forth, there will be 24 samples.

Spillover. During normal shredding operations, fluff will pile up along conveyor belts and cyclone separators. We will refer to this fluff as spillover. Spillover tends to consist of smaller particles, sometimes called "fines". Because these "fines" are suspected of being more susceptible to PCB contamination, you may want to take some samples of this material.

Inspect the area along the conveyor belt for spillover. Take five one-gallon samples of any spillover material along the conveyor belt at approximately equal distances. Mix these five one-gallon samples into one five-gallon bucket. If desired, repeat this procedure to fill additional buckets. In some cases, the pattern of spillover may not be regular enough to use this strategy. If necessary, identify the areas where spillover exists and take a one-gallon sample (or more) from

✓
each location to achieve one five-gallon sample (or more) that is representative of the spillover material.

2.3 Quality Assurance

The Necessity for Quality Assurance. There are many sources of error in evaluating contamination by PCBs or other substances. First, since we are selecting samples of material to analyze, there is *sampling error*, which is due to the fact that not all of the material is being analyzed and thus there is variability in the results from one sample to another. (Please note that sampling "error" is a statistical term which reflects the natural variation that exists from one sample to another. This term does *not* imply any "error" on the part of those collecting the samples!) Second, there is *analytical error*, which results from the difficulty of accurately identifying and quantifying the substances present in a given sample of material. Third, there is the possibility of errors through *cross-contamination*, which results from PCBs (or other substances)

any PCBs. Empty containers, such as buckets, should be taken to the site, opened for the duration of the time that sampling is done, and then closed and taken to the laboratory, where wipe samples can be taken and analyzed. This procedure will indicate whether containers were contaminated either before data collection or through improper handling. The use of field blanks helps protect the operator by indicating when samples are being collected improperly and possibly giving incorrect findings.

Duplicate Analyses. As a general practice, at least 10% of the samples selected should be analyzed in duplicate, meaning that the same sample (or parts of it) should be analyzed twice. In particular, if one sample has an extremely high concentration of PCBs relative to other samples, replicates should be analyzed for verification; Section 3 will discuss how replicates are formed. Preliminary studies suggest that laboratory or analytical error for the procedures described in this manual are, on average, about 30% of the estimated PCB level, ranging from 5% to 80%. If the results for replicates vary by more than this, it may be due to inadequate laboratory procedures.

3. PREPARATION FOR ANALYSIS

3.1 Preparing Fluff Samples for Laboratory Analysis

Overview. After samples are collected in the field, they must be prepared for laboratory analysis. Because of the extreme heterogeneity in some of these materials, one part of the sample can give an estimate which is not representative of the whole. In this section we will discuss procedures for splitting the collected samples into several replicates so that each replicate is representative of the original sample, containing the same components in approximately the same proportions. One or more of these replicates can then be analyzed to test for PCB contamination. The reason for creating such replicates is, first, to reduce the amount of material that is actually subjected to laboratory analysis, and, second, to create backup replicates for retesting if this becomes necessary. Altogether, at least five gallons of material should be prepared for analysis, with about 400-500 grams of this material actually undergoing analysis. In Section 3.2, we will discuss compositing, a technique for combining samples to reduce laboratory costs.

Step 1: Weigh the Fluff Sample. Determine the weight of the entire fluff sample. Since 400-500 grams of fluff are required for each replicate, weighing will indicate what fraction of each bucket of material will comprise a replicate. Generally, a five-gallon bucket of material will produce about eight replicates. However, if the weight of your fluff sample is substantially smaller than 3,200 grams or larger than 4,000 grams, then divide the weight of the sample by 450 to determine the number of replicates.

Step 2: Sort Out Large Pieces of Material. Pour the contents of the bucket onto a 9.5 mm screen above a laboratory tray or table with a nonabsorbent surface. Pieces that do not pass through the screen should be cut into pieces or milled until they are small enough to pass through the screen and then mixed into the sample. Larger pieces of material (metal, atypical wire, hard plastics) that cannot be cut with shears should be segregated. Smaller pieces of wire or other solid material that are distributed uniformly throughout the sample should remain with the sample.

Step 3: Divide Material into Replicates. Uniformly distribute the fluff which remains over the tray or table. This material will vary in composition, and dense granular materials (e.g., dirt, pulverized metal, plastics, glass, ceramics, etc.) will tend to settle below lighter material, such as shredded fabric and foam rubber. Care must be taken to ensure that these components of the fluff are uniformly distributed throughout the tray.

Using the information on the total weight of each sample, divide the fluff on the table into approximately equal parts, with the number of parts being equal to the number of replicates to be obtained. In most cases, you will divide the material on the table into eight roughly equal parts to form eight replicates.

Step 4: Cut Large Pieces and Distribute Among Replicates. In Step 2, large pieces that could not be easily cut were removed and set aside. Now cut these pieces with either tin snips or a hack saw, assuming that the materials can be cut using one of these tools, and distribute the pieces of the material equally among the replicates. If both cutting methods fail, the material should be analyzed separately, and any detected PCB levels should be prorated based on the number of replicates, the weight of the replicate, and the weight of the material. For example, suppose that eight replicates are produced, each weighing about 450 grams, and a large piece of material, weighing about 50 grams, cannot be cut. If the piece of material is analyzed and shown to have a PCB level of 30 ppm, then the revised PCB level for any replicate that is analyzed should be calculated as

$$\text{Revised PCB Level} = \frac{\frac{(30)(50)}{8} + (\text{Replicate PCBs})(450)}{\frac{(50)}{8} + (450)}.$$

Step 5: Place Replicates in Containers. Place each replicate in a container. Seal, label and number the container so that both the replicate number and original bucket number are included (e.g., Replicate #2 of 4 from Bucket #12).

3.2 Compositing

Because of the expense of analyzing samples at the laboratory, equal sized parts of two or more different samples are sometimes mixed together and sent to the laboratory for analysis as if the mixture were only one sample. Samples can also be composited after the preparatory steps described in Section 3.1; this method is preferable to compositing in the field, although it may be less cost effective. We will refer to the mixed sample as a *composite* sample (or simply a *composite*) and to the parts that were mixed together as *subsamples*. This procedure is illustrated in Figure 6. Because the subsamples have been mixed, the concentration of PCBs or other toxic substances in the composite sample should be roughly equal to the average of the concentrations

1. Mix each sample thoroughly

2. Divide samples into three or four subsamples

3. Take one subsample from each sample and composite them together. Subsamples should be about the same size

4. Mix the composite sample thoroughly before analyzing

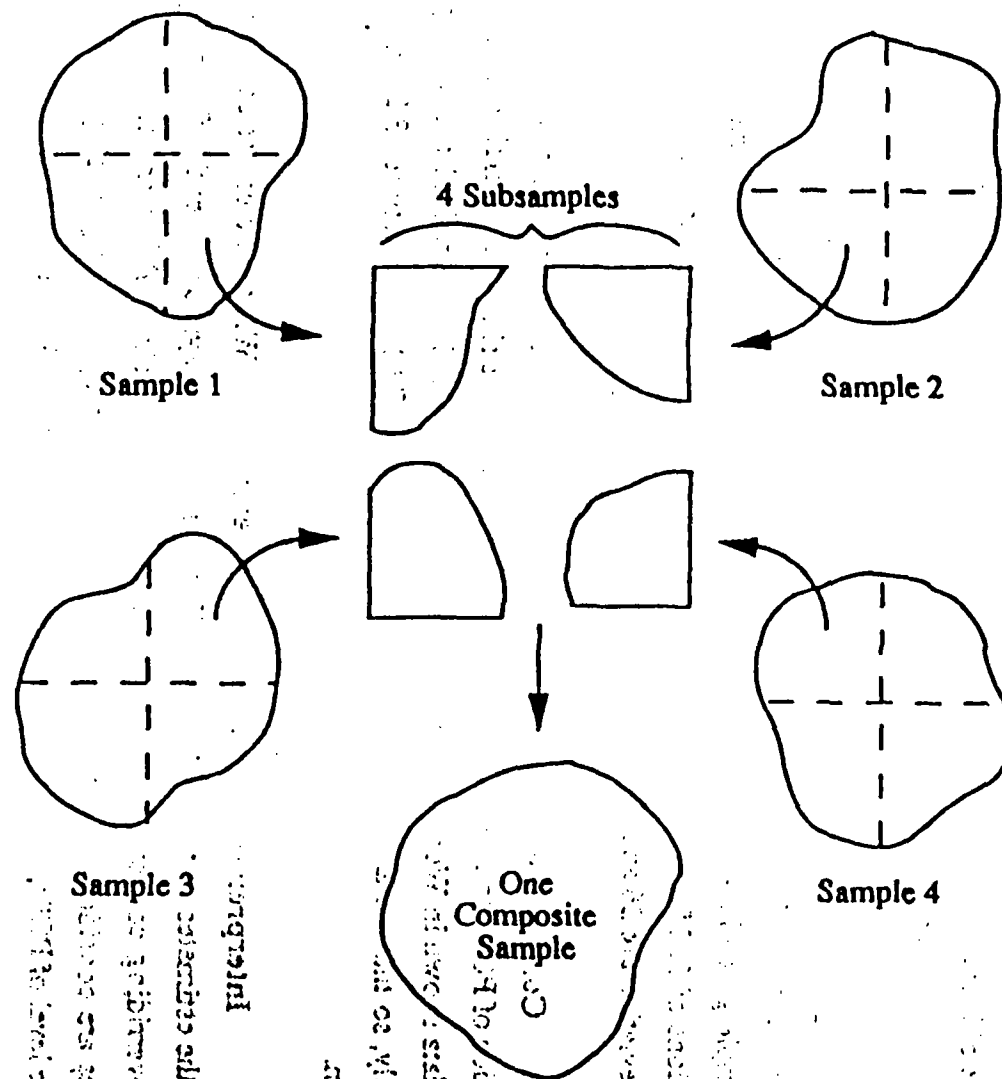


Figure 6. Guidelines for compositing samples

that would have been obtained by analyzing the subsamples individually, even though the concentrations in the subsamples may vary substantially due to the heterogeneous nature of fluff. Assuming that laboratory errors are not large compared with sampling error – which is almost always the case when analyzing samples of fluff – compositing effectively reduces the cost of laboratory analysis while maintaining about the same level of accuracy as if the samples had been analyzed individually.

When forming composite samples, several general rules should be followed. First, mix each sample thoroughly *before* compositing. Second, divide each sample into three or four parts, or subsamples. All the subsamples must be of roughly equal size. One simple method for dividing the sample is to spread the sample out on a clean area and split it into two, then four, equal parts. Another method is to take scoops of the material and put the first scoop in the first subsample, the second scoop in the second subsample, the third in the third subsample, and so on, repeating the process until the material is exhausted. Finally, take one subsample from each of the samples and combine them to make up the composite sample. Mix the composite sample thoroughly.

If the samples are from different sites or different parts of a single shredder (e.g., stored and fresh fluff), then use only one subsample – not the entire sample – for compositing. If large concentrations of toxic substances are found, it may be desirable to analyze part of each sample separately.

Throughout the next section we will discuss the effects of compositing on various analytical procedures. While compositing is normally considered to involve *two* or more subsamples, it is preferable for simplicity in presenting tables to speak of composite samples which consist of *one* or more subsamples. For example, if four samples of fresh fluff are taken over a period of 4 hours (as described in Section 2.2), these samples might be analyzed as one composite of four subsamples, two composites of two subsamples each, or as four “composites” of one subsample each.

APPENDIX B

SAMPLING QA/QC WORK PLAN

STANDARD SCRAP METAL

Prepared By:

ECOLOGY & ENVIRONMENT

Sampling QA/QC Work Plan

STANDARD SCRAP METAL

Prepared By:

Ecology & Environment, Inc.

U.S.EPA Project No.: T05-9410-143
Contractor Project No.: EIL0831FAA
U.S.EPA Contract No.: 68-WO-0037

Approvals

Ecology & Environment, Inc.

EPA

RAGHU NAGAM Date
Task Leader

STEVE FARYAN Date
On-Scene Coordinator/
Remedial Project Manager

RAGHU NAGAM Date
Project Manager

1.0 SITE BACKGROUND

The site is located in the City of Chicago which is located in Cook County in the State of IL. The nearest residents are located within 10.0 meters to the south.

It is a scrap metal recycling site on 2.7 acres which is still active. The site began operation in 1987. The site has been operating for approximately 7 years.

The following remedial units are present at the site: waste piles, and storage areas.

The following types of materials were handled at the site: inorganics, and polychlorinated biphenyls.

The contaminants of concern are:

Contaminant	Concentration Range
-----	-----
PCB'S	0-1,700 PPM
LEAD	0-30,000 PPM

The volumes of contaminated materials to be addressed are: PCB'S and lead contaminated soils approximating 3,500 cubic yards.

The suspected contamination is a result of: past activities at the site.

The physical/chemical threat to the population at risk is: direct contact and wind blown contaminated particulates with PCB'S and heavy metals.

The following sampling constraints have been identified: the site being still active poses constraints on sampling.

The following additional information is known about the site: the site has been in operation from about 1920. Operations included salvaging metal from motors etc, and shredding metal.

The basis of the site information is: site assessment report for Standard Scrap Metal by ECOLOGY & ENVIRONMENT, INC.

The current stage/phase of the project is: Cleanup Attainment.

2.0 DATA USE OBJECTIVES

The following data quality objectives will be applied to this project:

Program Area	Sampling Objective	Data Type
Removal	Identification of hot spots	S/C
Removal	Verification of cleanup	S/C/D
Removal	Extent of contamination	S/C

The required confidence level is 95% for screening data (S), 95% for confirmatory data (C), and 95% for definitive (D) data.

The rationale for confidence levels less than 95% is: not applicable

The data will be evaluated against Federal Regulatory Levels. The RCRA regulatory limit is 5.0 mg/kg for lead utilizing the Total Characteristic Leachate Procedure, and for total lead criteria, OSWER Directive #9355.4-02 for soil lead cleanup level of 500 ppm will be used. PCBs will be evaluated against Toxic Substance Control Act (TSCA) clean-up criteria of 10 ppm.

3.0 SAMPLING DESIGN

The following remedial units will be sampled as indicated.

Remedial Unit	Program Area Sampling Objective	Matrix	Parameter
Storage areas	Removal/Extent of contamination	Soil	Heavy Metals, PCBs
waste pile	Removal/Identification of hot spots	Soil	Heavy Metal Content

Sampling Designs:

Storage Areas, Removal/Extent of contamination, Soil, Metals

The Systematic Random sampling approach will be implemented to define the areal and vertical extent of contamination (EOC). Samples will be collected from the following locations and depths/areas: sample locations based on a 25 feet by 25 feet grid labelled A thru Q, and 1 thru 20 (Sample location grid map). Samples will be collected from 0-1 foot interval, 1-2 foot interval, 2-3 foot interval and 3-4 foot intervals before excavation. The EOC study will also enable to determine the volume of contaminated soil. on site can be estimated. The

beginning of the grid will be the north west corner of the site. Grids will be labelled A thru Q going south and 1 thru 20 going east. Each point on the grid will be field screened/sampled for PCBs and metals. PCB screening will be accomplished by analysis with ENSYS kits or by analysis at E & E warehouse using a gas chromatography. Stock pile samples will be composited as follows: 10 - 15 point compositing will be done.

Waste Pile, Removal/Identification of hot spots, Soil, Heavy Metal Content and PCBs

The Systematic Grid sampling approach will be implemented. Confirmation samples will be collected from the following locations and depths/areas: AT 25 FEET GRID NODES.

Samples will be composited as follows:

After excavation, confirmation sampling will be done by taking five samples within each grid (one from each corner and one from center) and compositing it for analysis in a commercial laboratory and/or in E & E warehouse. Duplicates of these five individual samples will be kept on site for future analysis if needed.

Background samples will be collected from the following locations if needed: LOCAL BALL PARK ON 55TH STREET.

Table 1, Sampling Summary, identifies the number of field samples and QA/QC samples to be collected.

4.0 SAMPLING AND ANALYSIS

Table 2, Sampling Requirements Summary, contains information pertinent to sampling, such as the sample container types and the quantity of sample to be collected at each sampling location, the preservation method to be used, and the sample holding times (based on the parameter being analyzed for and the matrix). For the air matrix, this table identifies the sample flow rate rather than sample containers and the volume to be collected rather than the preservative.

The following sampling equipment/media will be used to obtain environmental samples from the respective matrix:

Parameter/Matrix	Equipment/Media	Fabrication	Dedicated
Heavy Metal Content/Soil	Backhoe	carbon steel	N
	Decontamination Steps		
	1. Physical removal		
	2. Non-phosphate detergent wash		
	3. Potable water rinse		
	4. Air dry		

Parameter/Matrix	Equipment/Media	Fabrication	Dedicated
Heavy Metal Content/Soil	Scoop	carbon steel	N
	Decontamination Steps 1. Physical removal 2. Non-phosphate detergent wash 3. Potable water rinse 4. Air dry		
Heavy Metal Content/Soil	Shovel	carbon steel	N
	Decontamination Steps 1. Physical removal 2. Non-phosphate detergent wash 3. Potable water rinse 4. Air dry		
Heavy Metal Content/Soil	Bucket Auger	carbon steel	N
	Decontamination Steps 1. Physical removal 2. Non-phosphate detergent wash 3. Potable water rinse 4. Air dry		
Heavy Metal Content/Air	Gillian pumps, High VOLs	glass/filter	Y
	Decontamination Steps 1. Physical removal 2. Potable water rinse 3. Air dry		
PCBs/Soil	Auger	carbon steel	N
	Decontamination Steps 1. Physical removal 2. Non-phosphate detergent wash 3. Potable water rinse 4. Air dry		
PCBs/Soil	Backhoe	carbon steel	N
	Decontamination Steps 1. Physical removal 2. Non-phosphate detergent wash 3. Potable water rinse 4. Air dry		

Parameter/Matrix	Equipment/Media	Fabrication	Dedicated
PCBs/Soil	Bucket Auger	carbon steel	N
	Decontamination Steps		
	1. Physical removal		
	2. Non-phosphate detergent wash		
	3. Potable water rinse		
	4. Air dry		
PCBs/Soil	Scoop	carbon steel	N
	Decontamination Steps		
	1. Physical removal		
	2. Non-phosphate detergent wash		
	3. Potable water rinse		
	4. Air dry		
PCBs/Soil	Shovel	carbon steel	N
	Decontamination Steps		
	1. Physical removal		
	2. Non-phosphate detergent wash		
	3. Potable water rinse		
	4. Air dry		
PCBs/Air	Gillian Pumps, High VOLs	glass/filter	Y
	Decontamination Steps		
	1. Physical removal		
	2. Non-phosphate detergent wash		

Table 3, Analytical Summary, contains the action levels, required detection limits, analytical method/instrument references, and the associated required data type designation.

5.0 STANDARD OPERATING PROCEDURES

5.1 Sampling SOPs

The following sampling SOPs will be implemented for this project. These are typically applicable procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final project deliverables.

General Field Sampling Guidelines (#2001)

Sampling is the selection of a representative portion of a larger population, universe, or body. Through examination of a sample, the characteristics of the larger body from which the sample was drawn can be inferred. In this manner, sampling can be a valuable tool for determining the presence, type, and extent of contamination by hazardous substances in the environment.

The primary objective of all sampling activities is to characterize a waste site accurately so that its impact on human health and the environment can be properly evaluated. It is only through sampling and analysis that site hazards can be measured and the job of cleanup and restoration can be accomplished effectively with minimal risk. The sampling itself must be conducted so that every sample collected retains its original physical form and chemical composition. In this way, sample integrity is insured, quality assurance standards are maintained, and the sample can accurately represent the larger body of material under investigation.

The extent to which valid inferences can be drawn from a sample depends on the degree to which the sampling effort conforms to the project's objectives. For example, as few as one sample may produce adequate, technically valid data to address the project's objectives. Meeting the project's objectives requires thorough planning of sampling activities, and implementation of the most appropriate sampling and analytical procedures.

Sample Storage, Preservation, and Handling (#2003)

Samples should be collected using equipment and procedures appropriate to the matrix, parameters and sampling objective. The volume of the sample collected must be sufficient to perform the analysis requested. Samples must be stored in the proper types of containers and preserved in a manner appropriate to the analysis to be performed.

All samples must be cooled to 4°C from the time of collection until analysis. When a preservative other than cooling is used, the preservative is generally added after the sample is collected, unless the sample container has been pre-preserved by the laboratory. If necessary, the pH must be adjusted to the appropriate level and checked with pH paper in a manner which will not contaminate the sample.

Quality Assurance/Quality Control Samples (#2005)

QA samples are used as an assessment tool to determine if environmental data meet the quality criteria established for a specific application. QC samples are generally used to establish intralaboratory or analyst-specific precision and bias or to assess the performance of all or a portion of the measurement system. The goal of including QA/QC samples with any sampling or analytical event is to be able to identify, measure and control the sources of error that may be introduced from the time of sample bottle preparation through analysis.

Analytical results for these samples can be used to assess accuracy as well as cross contamination. Accuracy refers to the correctness of the concentration value and the qualitative certainty that the analyte is present. It is a combination of both bias (systematic error) and precision (random error). Bias is defined as the deviation of a measured value from a reference value or known spiked amount, and is determined by calculating percent recovery. Precision is a measure of the closeness of agreement among individual measurements. Precision is determined by coefficient of variation calculations.

Sampling Equipment Decontamination (#2006)

Removing or neutralizing contaminants from equipment minimizes the likelihood of sample cross contamination, reduces or eliminates transfer of contaminants to clean areas, and prevents the mixing of incompatible substances. The first step, a soap and water wash, removes all visible particulate matter and residual oils and grease. This may be preceded by a steam or high pressure water wash to facilitate residuals removal. The second step involves a tap water rinse and a distilled/deionized water rinse to remove the detergent. An acid rinse provides a low pH media for trace metals removal and is included in the decontamination process if metal samples are to be collected. It is followed by another distilled/deionized water rinse. If sample analysis does not include metals, the acid rinse step can be omitted. Next, a high purity solvent rinse is performed for trace organics removal if organics are a concern at the site. Typical solvents used for removal of organic contaminants include acetone, hexane, or water. Acetone is typically chosen because it is an excellent solvent, miscible in water, and not a target analyte on the Priority Pollutant List. If acetone is known to be a contaminant of concern at a given site or if Target Compound List analysis (which includes acetone) is to be performed, another solvent may be substituted. The solvent must be allowed to evaporate completely and then a final

distilled/deionized water rinse is performed. This rinse removes any residual traces of the solvent.

Soil Sampling (#2012)

Soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type.

Near-surface soils may be easily sampled using a spade, trowel, or scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

Waste Pile Sampling (#2017)

Stainless steel shovels, trowels, or scoops should be used to clear away surface material before samples are collected. For depth samples, a decontaminated auger may be required to advance the hole, then another decontaminated auger used for sample collection. For a sample core, thin-wall tube samplers or grain samplers may be used. Near surfaces, samples can be collected with a clean stainless steel spoon or trowel.

All samples collected, except those for volatile organic analysis, should be placed into a Teflon lined or stainless steel pail and mixed thoroughly before transfer to appropriate sample container.

5.2 Sample Documentation

All sample documents will be completed legibly and in ink. Any corrections or revisions will be made by lining through the original entry and initialling the change. The following sample documentation will be maintained:

Field Logbook

The field logbook is a descriptive notebook detailing site activities and observations so that an accurate, factual account of field procedures may be reconstructed. All entries will be signed by the individuals making them. Entries should include at least the following:

- o site name and project number
- o names of personnel on site
- o dates and times of all entries
- o descriptions of all site activities, including site entry and exit times

- o noteworthy events and discussions
- o weather conditions
- o site observations
- o identification and description of samples and locations
- o subcontractor information and names of on-site personnel
- o dates and times of sample collections and chain of custody information
- o records of photographs
- o site sketches

Field Data Sheets and Sample Labels

Field data sheets and corresponding sample labels are used to identify samples and document field sampling conditions and activities. Field data sheets should be completed at the time of sample collection and should include the following information:

- o site name
- o samplers
- o sample location and sample number
- o date and time the sample was collected
- o type of sample collected
- o brief description of the site
- o weather parameters
- o analyses to be performed
- o sample container, preservation, and storage information

Sample labels will be securely affixed to the sample container. They will clearly identify the particular sample, and should include the following information:

- o site name and project number
- o date and time the sample was collected
- o sample preservation method
- o analysis requested
- o sampling location

Chain of Custody Record

A Chain of Custody Record will be maintained from the time of sample collection until final deposition. Every transfer of custody will be noted and signed for and a copy of the record will be kept by each individual who has signed it. The Chain of Custody Record should include at least the following information:

- o sample identification
- o sample location
- o sample collection date
- o sample information, i.e., matrix, number of bottles collected, etc.
- o names and signatures of samplers

- o signatures of all individuals who have had custody of the samples

When samples are not under direct control of the individual currently responsible for them, they will be stored in a locked container which has been sealed with a Custody Seal.

Custody Seal

Custody Seals demonstrate that a sample container has not been opened or tampered with. The individual who has custody of the samples will sign and date the seal and affix it to the container in such a manner that it cannot be opened without breaking the seal.

5.3 Sample Handling and Shipment

Each of the sample bottles will be sealed and caps will be secured with custody seals. Sample bottles will be labeled as described above. Sealed bottles will be placed in the appropriate transport containers and the containers will be packed with an appropriate absorbent material such as vermiculite. All sample documents will be affixed to the underside of each transport container lid. The lid will be sealed and custody seals will be affixed to the transport container.

Regulations for packaging, marking/labeling, and shipping of hazardous materials and wastes are promulgated by the U.S. Department of Transportation (U.S. DOT). Air carriers which transport hazardous materials, in particular Federal Express, require compliance with the current edition of the International Air Transport Association (IATA) Dangerous Goods Regulations, which applies to shipment and transportation of hazardous materials by air carrier. Following current IATA regulations will ensure compliance with U.S. DOT.

6.0 QUALITY ASSURANCE REQUIREMENTS

The following QA requirements will be implemented on this project:

Screening Data

Screening data is data generated by rapid, non-rigorous methods of analysis, such as test kits and direct-reading instruments. Data indicate presence of compound or class of compounds at an imprecise concentration. Data do not provide definitive analyte identification or quantitation. Data are indicated by color changes or dial readings and

are documented in field logbooks or on field sample data sheets. Examples: GC analysis for PCBs; SPECTRACE XRF - screening for lead.

QA Deliverables for Screening Data

Sample Documentation
Instrument Calibration
Detection Limits

Confirmatory Data

Confirmatory data is data generated by rigorous analytical methods, such as CLP methods. Data are analyte-specific, with confirmation of analyte identity and/or concentration.

Instruments produce "raw data" such as chromatograms. Calibration data for field instruments are available. Instrumental analysis confirms both identity and quantitation and generates data sufficient to undergo validation by National Functional Guidelines. Data are found in field instrument printouts and laboratory data packages. Data may be generated in field or "fixed" laboratories as long as QA/QC requirements are met. Confirmatory data is a subset of a larger data set generated by less rigorous methods. The rigorous data set confirms presence and concentrations of compounds detected by less stringent methods. Examples: AA or ICP data under EPA-approved methods; field GC with confirmation by laboratory GC/MS under EPA-approved methods.

QA Deliverables for Confirmatory Data

Sample Documentation
Chain of Custody Records
Initial and Continuing Instrument Calibration
Detection Limits
Documentation of Sample Quantitation
Method Blanks, Trip Blanks, Rinsate Blanks
Matrix Spikes or Duplicates
Performance Evaluation (PE) Samples (optional)

Definitive Data

Data are definitive when analytical error is determined. Precision, accuracy, and coefficient of variation are determined for all samples. Error determination may be accomplished through the analysis of eight replicate samples. The same rigorous analytical methods which generate confirmatory data also generate definitive data, providing confirmed analyte identity and quantitation with

additional measures taken to provide error determination. Data are documented in laboratory data packages. Example: GC/MS analysis under EPA-approved methods with PE samples and eight replicate analyses.

QA Deliverables for Definitive Data

Sample documentation
Chain of Custody Records
Initial and Continuing Instrument Calibration
Detection Limits
Documentation of Sample Quantitation
Method Blanks, Trip Blanks, Rinsate Blanks
Matrix Spikes or Duplicates
Performance Evaluation (PE) Samples (required)
Analytical Error (precision, accuracy, coefficient of variation)

7.0 DATA VALIDATION

Data generated for this project will be validated as follows:

Screening Data

Screening data need only be evaluated for calibration and detection limits.

Confirmatory Data

Data generated under this QA/QC Sampling Plan will be evaluated accordingly with appropriate criteria contained in the Removal Program Data Validation Procedures which accompany OSWER Directive #9360.4-1.

The results of 10% of the samples in the analytical data packages should be evaluated for all of the elements listed in Section 6.0 of the QA/QC Sampling Plan. The holding times, blank contamination, and detection capability will be reviewed for all remaining samples.

Definitive Data

Data generated under this QA/QC Sampling Plan will be evaluated accordingly with appropriate criteria contained in Removal Program Data Validation Procedures which accompany OSWER Directive #9360.4-1.

This objective, the most stringent of all objectives, requires that at least 10% of the samples in the lab data

package be evaluated for all of the elements listed in Section 6.0 of this QA/QC Sampling Plan. Of the remaining samples, holding times, blank contamination, precision, accuracy, error determination, detection limits, and confirmed identification will be reviewed. This objective also requires review of all elements for all samples in each analyte category (i.e. VOA's and PCB's) in every tenth data package received from an individual lab.

8.0 DELIVERABLES

The Ecology & Environment, Inc. Task Leader/Manager, RAGHU NAGAM, will maintain contact with the EPA On-Scene Coordinator/Remedial Project Manager, STEVE FARYAN, to provide information regarding the technical and financial progress of this project. This communication will begin when the project is assigned. Activities under this project will be documented and reported in the deliverables described below.

Analytical Report

An analytical report will be prepared for samples analyzed under this plan. Information regarding the analytical methods or procedures employed, sample results, QA/QC results, chain of custody documentation, laboratory correspondence, and raw data will be provided within this deliverable.

Data Review

A review of the data generated under this plan will be undertaken. The assessment of data acceptability or useability will be provided separately, or as part of the analytical report.

Final Report

A (draft) final report will be prepared to correlate available background information with data generated under this sampling event and identify supportable conclusions and recommendations which satisfy the objectives of this sampling QA/QC plan.

Maps/Figures

The following illustrations will be provided:

Maps

Figures
Drawings

9.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

9.1 Personnel Information

The EPA On-Scene Coordinator/Remedial Project Manager, STEVE FARYAN, will provide overall direction to the Ecology & Environment, Inc. staff concerning project objectives, sampling needs, and schedule.

The Ecology & Environment, Inc. Task Leader/Manager, RAGHU NAGAM, is the primary point of contact with the EPA On-Scene Coordinator/Remedial Project Manager. The Task Leader/Manager is responsible for the development and completion of the Sampling QA/QC Plan, project team organization, and supervision of all project tasks.

The Ecology & Environment, Inc. Site QC Coordinator, Dave Hendrin, is responsible for ensuring field adherence to the Sampling QA/QC Plan and recording any deviations. The Site QC Coordinator is also the primary contact with the analytical laboratory.

The following personnel will also work on this project:

Name	Responsibility
Dave Hendrin	QC coordinator
Mary Jane Ripp	QA/QC Coordinator

9.2 Laboratory Information

The following laboratories will be providing the following analyses:

Lab Name/Location	Lab Type	Parameters
EMT/Morton Grove, IL		Total & TCLP metals, PCBs
QAL/Lisle, IL		Total & TCLP metals, PCBs
NATLSCO/Long Grove, IL		Lead and PCBS

10.0 SCHEDULE OF ACTIVITIES

Proposed Schedule of Work

Activity	Start Date	End Date
-----	-----	-----
sampling	11/01/94	02/25/95
mobilization	11/01/94	11/05/94
demobilization	05/25/95	05/30/95

11.0 ATTACHMENTS

The following are attachments to this Sampling QA/QC Plan:

- Site Location Map
- Grid Sample Location Map
- E & E SOP's
- XRF - SOP's
- EN SYS - SOP's
- Target Analyte List - Inorganics
- Target Compound List - Pesticides/PCBs

Standard Scrap
Figure 1 - Site Location Map

Standard Scrap
Figure 2 - Grid sample location map

E & E SOP's

INORGANIC TARGET ANALYTE LIST (TAL)

Analyte	Detection Limit (ug/L -- water (1))
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	3
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20
Cyanide	10

(1) Sediment detection limit 100x water (ug/kg soil/sediment).

Based on the Contract Laboratory Program Statement of Work,
ILMO2.1 (9/91).

TARGET COMPOUND LIST (TCL) AND
QUANTITATION LIMITS (QL) (1)

Pesticides/PCBs	CAS Number	Quantitation Limits(2)		
		Water ug/L	Low Soil/Sediment(3) ug/Kg	
98.	alpha-BHC	319-84-6	0.05	1.7
99.	beta-BHC	319-85-7	0.05	1.7
100.	delta-BHC	319-86-8	0.05	1.7
101.	gamma-BHC (Lindane)	58-89-9	0.05	1.7
102.	Heptaclor	76-44-8	0.05	1.7
103.	Aldrin	309-00-2	0.05	1.7
104.	Heptachlor epoxide	1024-57-3	0.05	1.7
105.	Endosulfan I	959-98-8	0.05	1.7
106.	Dieldrin	60-57-1	0.10	3.3
107.	4,4'-DDE	72-55-9	0.10	3.3
108.	Endrin	72-20-8	0.10	3.3
109.	Endosulfan II	33213-65-9	0.10	3.3
110.	4,4'-DDD	72-54-8	0.10	3.3
111.	Endosulfan sulfate	1031-07-8	0.10	3.3
112.	4,4'-DDT	50-29-3	0.10	3.3
113.	Methoxychlor	72-43-5	0.50	17.0
114.	Endrin ketone	53494-70-5	0.10	3.3
115.	Endrin aldehyde	7421-36-3	0.10	3.3
116.	alpha-Chlordane	5103-71-9	0.5	1.7
117.	gamma-Chlordane	5103-74-2	0.5	1.7
118.	Toxaphene	8001-35-2	1.0	170.0
119.	Aroclor-1016	12674-11-2	0.5	33.0
120.	Aroclor-1221	11104-28-2	0.5	33.0
121.	Aroclor-1232	11141-16-5	0.5	67.0
122.	Aroclor-1242	53469-21-9	0.5	33.0
123.	Aroclor-1248	12672-29-6	0.5	33.0
124.	Aroclor-1254	11097-69-1	1.0	33.0
125.	Aroclor-1260	11096-82-5	1.0	33.0

- (1) Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.
- (2) Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment on dry weight basis will be higher.
- (3) Medium Soil/Sediment Quantitation Limits (QL) for Pesticides/PCB TCL compounds are 15 times the individual Low Soil/Sediment QL.

Based on the Contract Laboratory Program Statement of Work,
OLMO1.6 (6/91).

APPENDIX C

**U.S. EPA's
REQUEST FOR INFORMATION
DATED 5/5/95**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:

Chicago International Chicago, Inc.
4020 South Wentworth Avenue
Chicago, Illinois 60609

Attention: Steven Cohen, President

REQUEST FOR INFORMATION PURSUANT TO THE CLEAN AIR ACT

The United States Environmental Protection Agency (U.S. EPA), by David Kee, Director of the Air and Radiation Division, Region 5, hereby requires Chicago International Chicago, Inc. (CIC), to submit certain information related to its Chicago, Illinois, facility pursuant to the Clean Air Act (Act), 42 U.S.C. § 7401 et seq. The Administrator of U.S. EPA is authorized to require submittal of such information by Section 114(a) of the Act, 42 U.S.C. § 7414(a) (hereinafter referred to as Section 114(a)). Authority to require submittal of information pursuant to Section 114(a) has been delegated to the Director of the Air and Radiation Division. The information to be submitted in response to this request is specified in Appendix A.

CIC is the owner and operator of an emission source as specified in Section 114(a) of the Act. The information sought by this request is necessary for U.S. EPA to determine whether CIC is in compliance with Illinois Environmental Protection Agency Operating Permit 94030066 and 35 Ill. Adm. Code 212.321.

The test report specified in Appendix A must be submitted within sixty (60) calendar days of receipt of this request, or within sixty (60) calendar days of commencement of operation of any of the lines specified in Appendix A, for all lines not currently operating. The request for information in Appendix A is ongoing until CIC tests all lines specified in Appendix

A. All information submitted in response to this request must be certified as true, correct, accurate, and complete by an individual with sufficient knowledge and authority to make such representations on behalf of CIC. All required information should be sent to U.S. EPA, Regulation Development Branch (AR-18J), 77 West Jackson Boulevard, Chicago, Illinois 60604, Attention: Adrienne Phillips. Copies of the required information should be sent to David Kolaz, Chief, Compliance and Systems Management Section, Illinois Environmental Protection Agency, 2200 Churchill Road, P.O. Box 19276, Springfield, Illinois 62794-9276.

Failure to fully comply with the terms of this request for information may subject CIC to an enforcement action under Section 113 of the Act, 42 U.S.C. § 7413, (hereinafter referred to as Section 113).

Pursuant to 40 C.F.R. Part 2, Subpart B, 41 Fed. Reg. 36902 (Sept. 1, 1976), as amended by 43 Fed. Reg. 40000 (Sept. 8, 1978); 50 Fed. Reg. 51661 (Dec. 18, 1985), CIC is entitled to assert a claim of business confidentiality regarding any portion of the information submitted in response to this request, except emission data, as defined at 40 C.F.R. § 2.301(a)(2). Failure to assert a claim of business confidentiality renders all submitted information available to the public without further notice. Information which is subject to a claim of business confidentiality may be available to the public only to the extent provided in 40 C.F.R. Part 2, Subpart B.

Any information submitted in response to this request may be used by U.S. EPA in support of an administrative, civil, or criminal action against CIC. Knowing submittal of false information to U.S. EPA, in response to this

Appendix A

Stack testing shall be performed at the Metal Shredding Line, Metal Sorting Line #1, and Metal Sorting Line #2 in accordance with U.S. EPA Methods 1-5, 40 CFR Part 60, Appendix A. The stack tests shall include:

1. One stack test, consisting of three runs, at each of the aforementioned lines during which the associated line is operated at the maximum process weight rate that was practically achievable during the past year or is expected to be achievable in the future, whichever is greater.
2. During the stack tests, the following parameters shall be recorded:
 - a. temperature at baghouse inlet
 - b. pressure drop across the baghouse
 - c. actual process weight rate in pounds per hour
 - d. number and type of baghouse bags
3. Visible emissions observations shall be performed by a certified observer in accordance with U.S. EPA Method 9, 40 CFR Part 60, Appendix A, throughout the test period.
4. Notification of intent to test, including the scheduled testing date and proposed testing protocol, shall be made to U.S. EPA no later than 15 days prior to testing. Personnel designated by the agency shall be permitted to observe all testing, ask questions of the testing personnel, and to make whatever records of testing such representatives deem necessary, including tape recordings and photographs.
5. Results of all emission testing shall be submitted in a bound report to U.S. EPA and the Illinois Environmental Protection Agency. The report shall include all applicable data identified in paragraphs 2 and 3 above.


Total Metals
PCB - Substrate
3 Asphalts
Three (1) hour test
& recovery
samples
Bk. day
Modified Method
5
DAVID
Mostanni - PLATT
Particulate
Method
OZAWA
Method - De.
2 - Air
3 - Waste
4 - Moisture
Flare

request, may be actionable under Section 113(c)(2) of the Act, as well as 18 U.S.C. § 1001, and 18 U.S.C. § 1341. This request is not subject to the Paperwork Reduction Act, 44 U.S.C. § 3501 et seq., because it seeks collection of information in an administrative action or investigation involving U.S. EPA and specific individuals or entities.

Any questions concerning this request for information should be directed to Brent Marable, of my staff, at (312) 886-6812.

Date

5/5/95


David Kee, Director
Air and Radiation Division